Pictorial Empathy Test (PET) An Easy-to-Use Method for Assessing Affective Empathic Reactions

Lindeman, Marjaana

2018-11

Lindeman , M , Koirikivi , I & Lipsanen , J 2018 , ' Pictorial Empathy Test (PET) An Easy-to-Use Method for Assessing Affective Empathic Reactions ' , European Journal of Psychological Assessment , vol. 34 , no. 6 , pp. 421-431 . https://doi.org/10.1027/1015-5759/a000353

http://hdl.handle.net/10138/309833
https://doi.org/10.1027/1015-5759/a000353

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acceptedVersion

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An Easy-to-Use Method for Assessing Affective Empathic Reactions.

Marjaana Lindeman, Iivo Koirikivi and Jari Lipsanen

University of Helsinki

Marjaana Lindeman, Iivo Koirikivi and Jari Lipsanen, Institute of Behavioural Sciences, University of Helsinki.

Correspondence concerning this article should be addressed to Marjaana Lindeman. Correspondence address: P.O. Box 9, Division of Cognitive Psychology and Neuropsychology, Institute of Behavioural Sciences, 00014 University of Helsinki, Finland. E-mail: marjaana.lindeman@helsinki.fi, Phone: +358-50-5178244, Fax: +358 - 2- 941 29542.

Acknowledgement: This study was supported by the Research Funds of the Academy of Finland (No. 265518). We thank Annika Svedholm-Häkkinen for providing useful comments on an earlier version of this manuscript.

Abstract

(1) Background. Research on empathy has increased rapidly during the last decades but brief assessment methods are not easily available. (2) Aims. The aim was to develop a test for affective empathic reactions which would be simple to translate into different languages, easy to use in a variety of research settings, and which would catch the empathic reactions at the moment they arise. (3) Methods. We describe the development and validation of the Pictorial Empathy Test (PET) in three studies (Study 1, N = 91; Study 2, N = 2789; and Study 3, N = 114). The PET includes seven photographs about distressed individuals and the participants are asked to rate on a five-point scale how emotionally moving they find the photograph. (4) Results. The results indicated that the PET displayed a unitary factor structure and it had high internal consistency and good seven-month test-retest reliability. In addition, the results supported convergent and discriminant validity of the test. (5) Discussion. The results suggest that the PET is a useful addition to the prevailing methods for assessing affective empathy.

Keywords: affective empathy; pictorial test; empathic reactions

Pictorial Empathy Test (PET).

An Easy-to-Use Method for Assessing Affective Empathic Reactions

Empathy, the responsivity to the experiences of other people (Davis, 1983), is a fundamental contributor to altruism and prosocial behavior, ethical sensitivity, and positive interpersonal relationships (reviews: Decety & Jackson, 2004; Eisenberg & Miller, 1987). According to the most comprehensive theory on empathy, Baron-Cohen's empathizing-systemizing theory, empathy is one of the two evolutionarily primary cognitive systems that come in degrees in the general population. Whereas systemizing works well for understanding inanimate, physical phenomena, empathizing is a powerful way of understanding the social world. Besides shaping the way people deal with psychological phenomena in everyday life, empathizing is proposed to account for a number of phenomena, including individual differences in brain activity and in symptoms of autism spectrum disorders (ASD), as well as in interests, hobbies, educational grades, and occupations, and in the sex differences thereof (Baron-Cohen, 1999, 2002; Baron-Cohen, Knickmeyer, & Belmonte, 2005).

There is a wide consensus that empathy comprises two dimensions: cognitive empathy and affective or emotional empathy (Baron-Cohen & Wheelwright, 2004; Cox et al., 2012; Davis, 1983; Decety & Jackson, 2004; Shamay-Tsoory, Aharon-Peretz, & Perry, 2009). Cognitive empathy involves identifying another's mental states. Affective or emotional empathy – the focus of this study – involves the sharing of other people's emotions and the tendency to experience personal unease when witnessing the distress of other people in particular (Davis, 2006). Accordingly, affective empathy is often expressed in response to others' negative emotional states (Dziobek et al., 2008; Eisenberg & Miller, 1987; Kirchner, Hatri, Heekeren, & Dziobek, 2011; Rozin & Royzman, 2001). As Rozin and Royzman (2001)

put it, if someone told you “I just got engaged,” it would be odd to reply, “You have my empathy”. Although empathy is sometimes conceptualized as an ability, we follow here researchers who define empathy as a personality trait (Baron-Cohen & Wheelwright, 2004; Davis, 2006)

Theories and research from different fields show that cognitive and affective empathy are dissociable phenomena. They are based on different neurocognitive mechanisms, and deficits in cognitive and affective empathy have differential effects. To illustrate, low affective empathy, but not low cognitive empathy, is related to bullying (Jolliffe & Farrington, 2006b) and narcissistic personality disorder (Ritter et al., 2011). In turn, low cognitive empathy, but not low affective empathy, is related to offending (Jolliffe & Farrington, 2004), schizophrenia (Ritter et al., 2011), and borderline personality disorder (Harari, Shamay-Tsoory, Ravid, & Levkovitz, 2010). Furthermore, altruistic motivation for ingroup members is associated with cognitive, but not affective empathy (Mathur, Harada, Lipke, & Chiao, 2010).

Affective and cognitive empathy has been assessed for a long time, initially with observation and skin conductance response, recently also with functional magnetic resonance imaging. Although easy-to-use methods with naturalistic stimuli are available for cognitive empathy (e.g., Reading the Mind in the Eyes Test, Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), we know no such methods for affective empathy. The most often used measure is a questionnaire, which typically also includes items addressing cognitive and other potential components of empathy. Examples include the Questionnaire Measure of Emotional Empathy (Mehrabian & Epstein, 1972), the Interpersonal Reactivity Index (Cliffordson, 2001; Davis, 1983), the Empathy Quotient (Baron-Cohen & Wheelwright, 2004), the Toronto Empathy Questionnaire (Spreng, McKinnon, Mar, & Levine, 2009), the

Questionnaire of Cognitive and Affective Empathy (Reniers, Corcoran, Drake, Shryane, & Völlm, 2011), and the Basic Empathy Scale in Adults (Carré, Stefaniak, D'Ambrosio, Bensalah, & Besche-Richard, 2013).

Although questionnaires have several advantages, they can be limited in some respects. First, questionnaires are often quite long. Consequently, the scale may be time-consuming to fill in, it may take up too much space in surveys, and it may be troublesome to translate the items to another language, which in turn may lower the reliability and validity of the scale. Second, questionnaires do not account for individual and cultural differences in interpretation of the items or one's typical emotional reactions. Third, some individuals are not able to read questionnaires. Finally, questionnaire statements do not produce authentic empathic reactions. To overcome these shortcomings, we developed a short test for affective empathy, the Pictorial Empathy Test (PET).

The stimuli of the PET were inspired by the Multifaceted Empathy Test (MET, Dziobek et al., 2008; Kirchner et al., 2011). The MET's stimuli comprise 46 photographs of contexts and of distressed people in these contexts. Administration of the MET is a multi-stage, half-hour interview process, and the test yields response times and scores on cognitive empathy, and emotional reactions to the context and to the persons.

Using photographs of individuals in a vulnerable state is an ecologically valid way of assessing affective empathy because facial expressions of emotions are central to empathic responses, generating an emotional resonance mechanism in the observer (Balconi, Bortolotti, & Gonzaga, 2011). Most importantly, the participant's reactions can be recorded in the moment they arise. For these reasons, we aimed to develop a test on affective empathy with photograph stimuli. The objective was to develop a test which could be easily

used in studies with larger populations, simple to translate into different languages, easy to use in a variety of research designs and research environments, and quick to complete.

To establish evidence for the PET's convergent and discriminant validity, we tested the following hypotheses. First of all, we expected that people who scored high on the PET would also score high on other scales of affective empathy. We used two scales for this purpose, the Short Empathy Quotient scale (EQ-Short Muncer & Ling, 2006) in Study 2 and the Basic Empathy Scale in Adults (BES-A, Carré et al., 2013; see also (Jolliffe & Farrington, 2006a) in Study 3. The EQ-Short is a more valid and reliable version of the original 60-item scale (Baron-Cohen & Wheelwright, 2004). The scale has three subscales: cognitive empathy, social skills, and emotional reactivity. We expected that those who scored high on the PET would also score high on the EQ-Short, and on the emotional reactivity subscale in particular (Hypothesis 1).

With the BES-A, it is possible to examine two or three components of empathy (Carré et al., 2013). If used with the two-factor structure, cognitive and affective empathy can be assessed. If used with the three-factor structure, it is possible to assess cognitive empathy and two mechanisms that are involved in affective empathy, namely emotional contagion and emotional disconnection. Emotional contagion refers to automatic replication of another person’s emotions and to a rapid evaluation, whether the emotion is pleasant or aversive. Emotional disconnection relates to withdrawal from emotion, that is, to inhibitory and regulatory functions which protect an individual from excessive emotions. To keep all the empathy concepts parallel, we use here the concept of emotional connection rather than disconnection. We expected that those who scored high on the PET, would also score high on the BES-A, and on affective empathy more than on cognitive empathy (Hypothesis 2).

Based on earlier findings (Derntl et al., 2010; Jolliffe & Farrington, 2006a; Reniers et al., 2011), we also expected that females would report greater affective empathy than men (Hypothesis 3). According to Graham and Ickes's (1997) theory, females may also want to appear more empathic than men and to feel a greater obligation to do so because of social expectations. Because female gender role identity has been shown to be an important, if not even a more important predictor of affective empathy than biological sex (Ickes, Gesn, & Graham, 2000; Karniol, Gabay, Ochion, & Harari, 1998) we hypothesize that high PET scores are positively related with feminine identity (Hypothesis 4). In line with earlier findings on masculine identity and empathy (Karniol et al., 1998), we hypothesize that the PET scores are unrelated with masculine identity (Hypothesis 5).

The next hypothesis concerns the relationship between affective empathy and symptoms of autism spectrum disorders (ASD), of which many are continuously distributed in the population (Constantino & Todd, 2003). For the present, very little is known about the association between ASD symptoms and empathy deficits in normal populations. Moreover, the question whether ASD symptoms are related to impaired emotional and cognitive empathy (as found by Mathersul, McDonald, & Rushby, 2013) or only to impaired cognitive empathy (as found by Dziobek et al., 2008), is open. However, recent evidence has shown that people with ASD symptoms can recognize distress in familiar faces but not in unfamiliar faces (Gillespie, McCleery, & Oberman, 2014), suggesting that ASD symptoms are negatively related to responses on the PET. Because even mild ASD traits should also theoretically predict impaired empathy (Baron-Cohen, 2002; Crespi & Badcock, 2008), we expected that ASD symptoms are inversely related to the scores (Hypothesis 6).

Finally, we expected that the PET scores are associated with an intuitive thinking style (Hypothesis 7), but not with an analytical thinking style (Hypothesis 8). The rationale for this

hypothesis is based on findings that an intuitive thinking style is related to affective empathy (Norris & Epstein, 2011) and that the brain areas associated with heuristic and automatic thinking are associated with emotional appraisal and affective empathic reactions (Lieberman, 2007). An analytical thinking style, in contrast, has shown no associations with emotional empathy (Norris & Epstein, 2011).

We next describe three studies on the development of the PET. Study 1 was conducted to select the items for the PET. Study 2 describes convergent and discriminant validity analyses and the validation of one-factor structure of the scale. Study 3 investigated the test-retest reliability of the PET, and included the BES-A as the convergent validity criterion.

Study 1

The participants were 91 Finnish respondents (49% females; mean age 42.90, age range 23-71). The material comprised 22 photographs of men, women, girls and boys in distress. The photographs were obtained from the freely-licensed photographs in Wikimedia Commons. Search terms related to sadness and fear, such as sad, scared, fear, fright, disabled persons, and war were used to search for these images from the emotions category. These search terms were used because negative emotions, especially expressions of sadness and fear serve a crucial communicatory role in human interaction: if an individual's responses to other people's fear and sadness are attenuated, the socialization process is jeopardized, and the individual may not learn to avoid committing behaviors that cause harm to others (Blair, 2003; Blair, Colledge, Murray, & Mitchell, 2001). In addition, expressions of fearful and sad facial expressions have a special communicatory function: more than angry or embarrassed faces, for example, they convey information to others on what should be avoided (Blair, 2003).

The study was conducted as an online survey. With each photograph, the participants were asked “How emotionally moving do you find the photograph?” (1 = not at all, 2 = a little bit; 3 = it arouses some feelings, 4 = quite a lot, 5 = very much). We used the Finnish term "koskettava" which means emotionally moving / affecting.

The aim of Study 1 was to find the optimal balance between a brief measure that can still demonstrate high reliability, and that includes photographs of men, women, girls and boys. One photograph was eliminated because its availability for free use turned out to be questionable. After this, photographs of men, women, girls and boys, especially those which received the lowest empathy ratings, were removed one by one. As a whole, 15 photographs were excluded. The reliability (Cronbach's α) of the set of seven photographs was .90.

Study 2

Participants and Procedure

The participants were 3084 Finnish individuals (66% females). Their mean age was 27.6 years (*SD* = 8.80, range 15–69). Of the participants, 24% were working, 67% were students, and 9% were occupied in other activities (e.g., as housewives). Of the students, most were university students (81%) but polytechnic, vocational school, upper secondary school, and grammar school students were also included in the sample.

Of the 3086 people who originally took part, two were excluded because their comments about the study revealed that they had not completed the survey seriously. Data was collected via web-based questionnaire. The participants were recruited to the on-line study via several open internet discussion forums and student mailing lists. The participants were told that the study concerned thinking and personality, and confidentiality and voluntary participation were emphasized.

Material

Pictorial Empathy Test (PET). The participants were sequentially presented seven photographs of individuals in distress. Two of the photographs were of women, two of men, two of boys, one photograph depicted a girl, and one depicted a baby whose sex was not identifiable in the photograph. Illustrations of the seven photographs can be found in the Appendix. The original photographs can be loaded from the Supplemental material or from the links provided in the Appendix. With each photograph, the participants were asked "How emotionally moving do you find the photograph?" (1 = not at all, 2 = a little bit; 3 = it arouses some feelings, 4 = quite a lot, 5 = very much). To obtain the PET score, a mean score of the responses was calculated. The photographs had been downloaded from Wikimedia Commons with the highest possible resolution and their size in the e-form was about one eighth of the screen.

Convergent and divergent validity measures. Self-reported empathizing was measured with the short, 15-item version of the Empathy Quotient scale (EQ-Short, Muncer & Ling, 2006). Example items include "I can tune into how someone else feels rapidly and intuitively" (cognitive empathy), "I find it hard to know what to do in a social situation" (social skills, reversed), and "I really enjoy caring for other people" (emotional reactivity). The scale was scored using the normative weights (Baron-Cohen & Wheelwright, 2004): the response format (1 = strongly disagree, 2 = slightly disagree, 3 = slightly agree, 4 = strongly agree) was converted into scores of 0, 0, 1, and 2. The rationale for the scoring is that participants score 2 points only if they display an empathizing response strongly and 1 point if they display an empathizing response slightly. We calculated the total EQ score (Cronbach's α = .81), emotional reactivity score (α = .67), cognitive empathy score (α = .79), and social skills score (α = .71).

Gender role was assessed with the 20-item Bem Sex Role Inventory (SRI, Bem, 1981). In the SRI, the participants are asked on a seven-point scale (1 = *never*, to 7 = *always*) how often the typical feminine (e.g., compassionate) and masculine (e.g., independent) traits describe them. The reliability (α) for the femininity scale was .89 and for the masculinity scale .84.

Intuitive and analytic thinking were assessed with the 10-item Faith in Intuition subscale (α = .79) and with the 12-item Need for Cognition subscale (α = .86) from the Rational/Experiential Multimodal Inventory (REIm, Norris & Epstein, 2011). Example items include "I often go by my instincts when deciding on a course of action" (intuitive thinking) and "I enjoy intellectual challenges" (analytical thinking). The items were rated on a four-point scale (1 = *strongly disagree*, 4 = *strongly agree).*

Symptoms of autism spectrum disorders were assessed using the 28-item abridged version of the Autism Spectrum Quotient (Hoekstra et al., 2011). The items were rated on a four-point scale (1 = *strongly disagree*, 4 = *strongly agree*). Reliability (α) of the scale was .81. Example item: "I prefer to do things the same way over and over again".

Results

The reliability of the PET was high, α = .90, and the responses ranged on the 5-point scale from 1 to 5 (*M* = 3.55, *SD* = 0.94).

The factor structure of the PET was investigated using confirmatory factor analysis (CFA) using MLR estimation with robust Huber-White standard errors in R software with lavaan package. Full Information Maximum Likelihood (FIML) estimation was used to handle missing values. To assess the fit of the models, we analyzed the following indices: the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR).

In the first model, the seven PET items were assigned to one latent factor and the error variances were set equal. This original model showed marginal comparative fit and SRMR, but poor root mean error square statistic: $\chi^2(14) = 440.854$, $p < .001$; SRMR = .03; CFI = .95; RMSEA = .104. Residual correlations between the photographs were low, indicating that the poor fit was caused by method variance and not by model specification error.

The model was therefore corrected by using modification indices and by allowing for correlated errors between photographs that had common content. Photographs 1, 2 and 5 display profound sadness in the subject's face, photographs 4, 5 and 6 are about children whose state of consciousness is unknown, photographs 1, 5 and 7 feature multiple people (one grieving or helping the other who is injured or dead), and photographs 6 and 7 feature injured faces. Following Cole, Maxwell, Arvey and Salas, 1993 (see alsoCrawford & Henry, 2004), we suggest that these correlated error terms are acceptable because a) which error term correlations were allowed was based on conceptual considerations, b) the maximum number of error correlations in this model is 21 and we permitted only 9, thus the model is far from being fully saturated, and c) magnitude of these correlations were modest in size (ranging from .06 to .36). Although the index of the absolute fit was significant, $\chi^2(5) = 45.34$, $p < .001$, the other fit indexes indicated good fit: SRMR = .01, CFI = .99, and RMSEA = .053. Factor loadings for the seven photographs ranged in size from .64 to .90 (1 =.66, 2 = .66, 3 = .90, 4 = .81, 5 = .64, 6 = .79, 7 = .67).

To evaluate the convergent and divergent validity of the PET, correlations were calculated between the PET scores and the other variables that theoretically should or should not be related to affective empathic reactions (Table 1). These variables were not calculated for participants who had 25% or more missing items in the scales to be computed. Probably because the survey was long (including also scales and tasks to be used in other

studies), many participants skipped one or more scales, resulting in a loss of 295 participants. Attrition analysis revealed that non-respondents were slightly more often women and slightly less educated, but the differences were trivial (Cramér's V = .04 - .05).

The results supported hypotheses 1, 4, 5, 6, 7 and 8 as the correlation was positive for self-reported empathy (especially for emotional reactivity), intuitive thinking, and feminine gender role; negative for symptoms of autism spectrum disorders, and near zero for analytical thinking and masculine gender role.

We used Williams' *t*-test (Weaver & Wuensch, 2013) to determine whether the differences between the correlations between the PET scores and scores on the three EQ - Short subscales would be statistically significant. We found that the correlation between the PET scores and emotional reactivity was significantly stronger than either the correlation between the PET scores and cognitive empathy, $t(2789) = 12.90$, $p < .001$, or between the PET scores and social skills, $t(2789) = 14.04$, $p < .001$.

Next, a univariate analysis of variance was conducted with the PET scores as the dependent variable and gender as the independent variable. The results supported Hypothesis 3 as females scored higher on the PET ($M = 3.77$) than men ($M = 3.15$), $F(1,2835) = 302.57$, $p < .001$, $\eta_p^2 = .096$. To differentiate the effects of female sex and female gender role, the same analysis was conducted with female gender role as a covariate. The effect of covariate was significant $F(1,2835) = 789.29$, $p < .001$, $\eta_p^2 = .218$, indicating that the PET scores were significantly different for those with feminine gender role than for the other participants. However, the main effect of sex was still significant after controlling for the gender role, $F(1,2835) = 160.65$, $p < .001$, $\eta_p^2 = .054$.

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Insert Table 1 about here

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Study 3

The participants were 114 Finnish individuals (57% females). Their mean age was 31 years (*SD* = 11.2, range 18 – 65). Of the participants, 29.8% were working, 53.5% were students, and 16.7% were occupied in other activities. Of the students, most were university students (90%) but polytechnic, vocational school, and upper secondary school, students were also included.

The message of the study was sent by e-mail seven months after the Study 2 to randomly selected 120 individuals who participated in Study 2. Of them, six did not take part in the present study. Of those who participated, eight could not be identified, and they were excluded from the test-retest analyses because their PET score from Study 2 remained unknown.

The data was collected via web-based questionnaire as in Study 2. Besides the PET (see Study 2), the participants filled in the Basic Empathy Scale in Adults, BES-A (Carré et al., 2013). The BES-A includes twenty 5-point items (1 = *strongly disagree*, 5 = *strongly agree*). Two types of subscales were used. According to the two-factor model, we calculated the subscales of affective empathy (α = .84, eleven items, e.g., "I tend to feel scared when I am with friends who are afraid") and cognitive empathy (α = .86, nine items, e.g., "I find it hard to know when my friends are frightened"). In addition, according to the three-factor model of empathy, we calculated the subscales of emotional contagion (α = .75, six items, e.g., "I get caught up in other people's feelings easily"), emotional connection (α = .66, six items, e.g., "My friends' emotions don't affect me much", reversed), and cognitive empathy (α = .83, eight items, e.g., "When someone is feeling 'down' I can usually understand how they feel").

The correlation between the PET scores in the present study and in Study 2 was .77, $p < .001$. The PET scores ranged from 1.71 to 5.00 ($M = 3.60$, $SD = 0.86$). Again in line with Hypothesis 3, females scored higher on the PET ($M = 3.81$) than men ($M = 3.30$), $F(1,112) = 10.78$, $p = .001$, $\eta_p^2 = .088$.

The PET scores correlated more strongly with affective empathy, $r = .46$, $p < .001$, than with cognitive empathy, $r = .26$, $p = .005$. Williams' t-test confirmed that the difference between the correlations was statistically significant, $t(139) = 2.22$, $p = 0.028$, supporting Hypothesis 2. When the three BES subscales were included in the analyses, the PET scores correlated strongly and positively with emotional contagion, $r = .45$, $p < .001$, strongly and positively with emotional connection, $r = .41$, $p < .001$, and moderately with cognitive empathy, $r = .30$, $p = .002$. However, the differences between these correlations were not significant, p-values > .09.

Discussion

Research on empathy and on related constructs, such as mentalizing and theory of mind, has increased rapidly during the last two decades. This suggests the need to develop new, diverse assessment methods alongside the current methods. The goal of the present studies was to introduce and validate a brief and convenient measure of affective empathy, the Pictorial Empathy Test.

The internal reliability and the seven-month test-retest reliability of the PET were good, and the model with a one-latent-factor structure behind the PET scores had a good fit with the data. Although the results confirmed the one-factor solution of the scale, we had to assume small error covariance behind some of the photographs, indicating that the levels of emotional arousal between the seven photographs were not completely unrelated. We consider this acceptable as it is probably not possible to develop an ecologically valid

measure including several emotionally touching photographs with uncorrelated measurement error.

The relationships between the PET scores and the other measures of empathy were in the hypothesized direction, supporting the convergent validity of the PET. First, the PET scores were positively related to self-reported empathy, when empathy was assessed with the EQ-Short questionnaire. The association with the emotional reactivity subscale of the EQ-Short was strong whereas the associations were moderate with the subscales of social skills and cognitive empathy. However, the low reliability coefficient of the emotional reactivity scale ($\alpha = .67$) raises concerns about the accuracy of this measurement. Second, the PET scores were positively associated with scores on the BES-A scale. When the BES-A items were divided into two subscales, the PET scores were strongly and positively associated with emotional empathy, and moderately with cognitive empathy. When the items were divided into three subscales, the PET scores were strongly and positively associated with emotional contagion and with emotional connection whereas the associations with cognitive empathy were lower but positive and significant.

These results are in line with the prevailing notion that cognitive and affective empathy are dissociable processes, and consequently they support the PET's ability to measure especially affective empathy. The results for the BES-A subscales also imply that the PET is able to assess the two dimensions of affective empathy (Carré et al., 2013), namely emotional contagion and the tendency to keep a boundary between one's own feelings and those of the other.

Also the other validity criteria were met, in line with theory and research on the association of affective empathy with sex and ASD traits (Baron-Cohen et al., 2005), with gender-role identity (Graham & Ickes, 1997), and with intuitive thinking (Lieberman, 2007).

Masculine gender role was not related with the responses, as expected. Although feminine gender role identity was responsible for a significant part of the relationship between participants' sex and their PET scores, sex had an independent effect on the scores. These finding are in line with earlier results that both females (Derntl et al., 2010; Jolliffe & Farrington, 2006a; Reniers et al., 2011) and individuals with feminine gender identity (Ickes et al., 2000; Karniol et al., 1998) score high in empathy measures. Finally, as expected, the PET scores were positively related with intuitive thinking but unrelated with analytic thinking as also found by Norris and Epstein (2011). The relationship with intuitive thinking was modest, indicating most probably the fact that intuition is a multidimensional concept, some of whose facets are related to emotional arousal (and thus to the PET scores), whereas other facets are not (Evans & Stanovich, 2013; Glöckner & Witteman, 2009).

Although all hypotheses were hence supported, and although cross-cultural agreement in the interpretation of facial expressions of emotion in photographs is very high (Ekman et al., 1987), it is important to remember that the studies were conducted in Finland. Future studies should therefore examine the applicability of the PET in other countries. Furthermore, additional methods are necessary to further examine the reliability and validity of the PET. Although the data provided by Internet methods have been shown to be at least as good quality as data obtained by traditional methods, the response environment or the respondents' identity cannot be controlled in on-line studies (Gosling, Vazire, Srivastava, & John, 2004). Moreover, as a brief self-report screening measure, the PET has the risks for superficiality and distorted responses, which are typical to self-report methods (Paulhus, 1984; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

As in many methods of empathy, PET includes only negative stimuli. For example, studies on the neural processes involved in empathy typically use negative stimuli.

Furthermore, only 0–15% of items in such questionnaires as IRI (Davis, 1983), the Toronto Empathy Questionnaire (Spreng et al., 2009), BES-A (Carré et al., 2013), and EQ-Short (Muncer & Ling, 2006) focus especially on positive empathy. The reason may be that substrates for processing negative emotions have been easy to locate relative to positive ones (Preston & De Waal, 2002) and that negative stimuli have greater informational value than positive stimuli (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Peeters & Czapinski, 1990; Rozin & Royzman, 2001). Nonetheless, this does not mean that positive affects do not result in the activation of empathic systems. Rather on the contrary, the few recent studies with positive stimuli indicate that areas that are activated in empathy are similar across positive and negative stimulus domains (Fan, Duncan, de Greck, & Northoff, 2011; Jabbi, Swart, & Keysers, 2007). It is hence important for future research to validate the PET with additional methods, for example with tests which includes also positive and other negative stimuli (e.g., expressions of anger), and by conducting multitrait-multimethod analysis. This analysis give more evidence of the convergent and discriminant validity of the PET and its validity measures, and of the latent factors that are proposed to underlie these measures (Campbell & Fiske, 1959).

Finally, a major limitation of PET is that responses to the question "How emotionally moving do you find the photograph?" reveal nothing about the nature of the emotion experienced by the participants. As an anonymous reviewer pointed out, it is possible that although a respondent (e.g., a psychopathic individual) experiences affective arousal when observing distressed people in the PET photographs, their affect may not be appropriate. This is exactly what Wai and Tiliopoulos (2012) found in their study: individuals higher in primary psychopathy felt more positively when looking at sad, angry, and fearful images (*r*'s= .19 - .25) and more negatively with happy images (*r* = -.23). It should be noted, however, that

the PET scores were strongly and positively related to affective sharing and replication of the stimulus person's emotions (i.e., the emotional contagion score of BES-A). Moreover, many studies have shown that psychopathic tendencies are associated with reduced neural and physiological activity when processing fearful, sad, and aversive expressions, whereas such inactivation in the processing of happy expressions has not been found (Anderson & Kiehl, 2012; Blair, 2007a; Blair, 2007b; Decety, Chen, Harenski, & Kiehl, 2013; Wai & Tiliopoulos, 2012). Although these findings suggest that individuals with psychopathy are not necessarily very responsive to distress cues, this limitation of PET should be taken into account when interpreting results obtained with PET.

Despite these limitations, we believe that our study provides evidence that the PET is a valid and reliable measure of affective empathic reactions. As such, the PET is a good alternative to text-based questionnaires because using photograph stimuli creates an opportunity for empathic emotional arousal in the moment the test is administered. Like questionnaires, the PET can be applied in several ways, as a paper-and-pencil test, as part of an interview, or as a web-based questionnaire. It also allows researchers to simultaneously test large masses of participants, where necessary. Furthermore, because the PET is quick and easy to use, it has all the benefits brief assessment methods generally have (Donnellan, Oswald, Baird, & Lucas, 2006; Gosling, Rentfrow, & Swann Jr, 2003): it is an ideal method for pre-screening assessment, longitudinal studies, large-scale surveys, and studies with financial or time limits; and it can eliminate item redundancy by reducing respondent boredom, fatigue and irritation about answering many, or even similar, questions again and again. Also in clinical settings it is helpful to have a brief, photograph-based test for affective empathy as the office visit is often time-limited, the mental status assessment should be multifaceted especially at the initial stage, and the patients may have problems in

verbalizing their empathic reactions with a questionnaire.

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Appendix

PET Photographs

The photographs are presented sequentially with the question and the response scale as exemplified with the Photograph 1. The photographs below are for illustration purpose only; the original photographs can be loaded from the provided links. Photographs 1 and 3 are in black and white, others are in color. If you use the photographs, please inform the participants at some point about the authors and the licenses they were published under.

Photograph 1. Load the original photograph 1 here.

"How touching do you find the photograph 1?" 1 = not at all, 2 = a little bit, 3 = it arouses some feelings, 4 = quite a lot, 5 = very much)

File name in Wikimedia Commons: "Julien Bryan - Life - 50893.jpg". License: This work is in the public domain.

Photograph 2. Load the original photograph 2 here.

File name in Wikimedia Commons: "2012 East Azerbaijan earthquakes. by Mardetanha 1527.JPG". License: GNU Free Documentation License [GFDL

(http://www.gnu.org/copyleft/fdl.html) or CC-BY-SA-3.0-2.5-2.0-1.0 (http://creativecommons.org/licenses/by-sa/3.0)]. Author: Mardetanha.

Photograph 3. Load the original photograph 3 here.

File name in Wikimedia Commons: "Rahima Banu.jpg". License: This work is in the public domain. Author: CDC/ World Health Organization Stanley O. Foster M.D., M.P.H.

Photograph 4. Load the original photograph 4 here.

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Photograph 5. Load the original photograph 5 here.

File name in Wikimedia Commons: “V rekonstrukcja Bitwy o Mławę, miasto 0992.jpg”. License: Creative Commons Attribution-Share Alike 3.0 Poland license. Author: Adam Kliczek, http://zatrzymujeczas.pl (CC-BY-SA-3.0)

Photograph 6. Load the original photograph 6 here.

File name in Wikimedia Commons: “Bala Baluk massacre by US troops.jpg”. License: Creative Commons Attribution-Share Alike 3.0 [CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0)]. Author: Rawa77

Photograph 7. Load the original photograph 7 here.

File name in Wikimedia Commons: “Wounded Minsk blast 2.jpg”. License: Creative Commons Attribution-Share Alike 3.0 [CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0)]. Author: Anton Motolko.